

SD11
A521
10.

FOREST STATISTICS
OF
SOUTHERN INDIANA



CENTRAL STATES
FOREST EXPERIMENT STATION
Columbus 13, Ohio
PHILIP A. BRIEGLEB, DIRECTOR

FOREST SURVEY RELEASE NO. 10

OCTOBER 1951

LIBRARY COPY
ROCKY MT. FOREST & RANGE
EXPERIMENT STATION

FOREST STATISTICS OF SOUTHERN INDIANA

By

THE FOREST SURVEY ORGANIZATION

of the
CENTRAL STATES FOREST EXPERIMENT STATION

These people have collected and compiled data or in some other way helped to prepare this report.

R. K. Winters, Chief, Division of Forest Economics
E. V. Roberts, In Charge, Forest Survey

Field Work - M. E. Becker, Field Supervisor
R. E. Doyle, T. A. Harrington,
B. H. Mauer, W. B. Metcalf
G. N. Semmens, E. F. Youngblood

Photo Interpretation - K. E. Moessner, In Charge
F. D. Brunson, C. E. Jensen,
K. W. Chrisemer

Computations - Lake F. Compton, Margaret Peirsol,
Mary Lou Sterner, Pauline Ramaley,
Violet Powell

Volume Tables and Statistical Analysis - G. L. Schnur

Stenographic Service - Edith Clark

C O N T E N T S

	<u>Page</u>
Significant facts - - - - -	1
Forest survey procedure - - - - -	34
Accuracy of data - - - - -	35
Explanation of terms used - - - - -	36

<u>Table number</u>	<u>Title</u>	<u>Lower Wabash</u> - - - - -	<u>Knobs</u> Page - - - - -	<u>Upland Flats</u> - - - - -
1	Forest and nonforest area by county	5	15	25
2	Commercial forest area by owner-ship class	6	16	26
3	Commercial forest area by forest type and stand-size class	7	17	27
4	Saw-timber volume by species and stand-size class	8	18	28
5	Saw-timber volume by species and tree-diameter class	9	19	29
6	Hardwood saw-timber volume by species group and percentage distribution in low grades	10	20	30
7	Total cubic volume by species and class of material	11	21	31
8	Cubic volume of primary growing stock by species and stand-size class	12	22	32
9	Cubic volume of primary growing stock by stand-size class and tree-diameter class	13	23	33
10	Average volume per acre by stand-size class	13	23	33

FOREWORD

The Forest Survey is a nation-wide activity of the Forest Service. The fivefold purpose of the Forest Survey is (1) to make a field inventory of the present supply of standing timber; (2) to find out how fast this supply is being increased through growth; (3) to find out how fast it is being diminished through industrial and domestic uses, windfall, fire, disease, and other causes; (4) to determine the present consumption and the probable future trend in requirements for forest products; and (5) to interpret and correlate these findings with existing and anticipated economic conditions, as an aid in formulating both private and public policies for use of land suitable for forest production.

The Forest Survey is conducted in the various regions by the forest experiment stations of the Forest Service. In Indiana the project is directed by the Central States Forest Experiment Station with headquarters in Columbus, Ohio.

This Survey Release presents the more significant preliminary statistics on the forest area and timber volume for each of the three regions of southern Indiana. A similar report will be published for the two northern Indiana regions. Later, an analytical report for the state will be published which will interpret statistics on forest area, timber-volume, growth, and drain in the light of existing and anticipated economic conditions.

SIGNIFICANT FOREST AREA AND TIMBER VOLUME STATISTICS
FOR SOUTHERN INDIANA

In this report the forest statistics for Southern Indiana are shown separately for three principal subdivisions or regions. These have been established in such a way as to group counties that have similar forest, soil, and economic conditions. A brief description of the physiographic and economic characteristics of each region follows.

Lower Wabash.--The level or gently rolling lands bordering the lower reaches of the Wabash, White, and Patoka rivers are part of a large region extending into Illinois and Kentucky. The river valleys are wide and flat; elevation is almost wholly below 700 feet. Coal mining is an important activity, especially in the northern part. The southern three counties, called "The Pocket," produce fine timber and contain much of Indiana's original cypress swamp area. Corn and wheat are the principal agricultural crops.

Knobs.--This south-central region is a succession of lowlands and uplands running north and south in fairly narrow belts, and includes most of the state's unglaciated area. In the center, a belt of rugged upland extending into picturesque Brown County is famous for its wooded hills or "knobs." Much of the land is unsuited for agriculture; much of the farming is on a subsistence level. On the areas of rough topography where the top-soil has been largely washed away, cleared land is reverting to forest. Timber is an important product, but the stands have been seriously overcut.

Upland Flats.--In southeastern Indiana is an old glaciated upland area that extends into Ohio and also forms part of the outer Bluegrass region of Kentucky. Short, steep streams descending to the Ohio river have deeply trenched the southeastern border, but in the north and central part of the region fairly extensive poorly-drained flats occur. On the western edge a broad slope descends to a lowland area on the edge of the Knobs region. Typical forests of the poorly-drained uplands are composed chiefly of beech, sweetgum, and pin oak. A general farming system produces corn, wheat, and hay in the western section, while dairy products and tobacco are important in the east.

The total land area of Southern Indiana is 9,5 million acres, of which 2.9 million acres or 30 percent is forested.^{1/} On the average, the counties in the Knobs region have the largest proportion of their land area in forest. Individually they range from 19 to 71 percent in forest and average 40 percent. In the Upland Flats region, forests occupy 28 percent of the land area and in the Lower Wabash region, 22 percent.

^{1/} For a definition of forest land, see page 36.

Ninety-two percent of the forest land is privately owned. The Hoosier National Forest and several state forests and parks account for most of the remaining 8 percent. Practically all of the forest area can be classified as commercial; less than 50,000 acres are non-commercial in the sense that timber cutting is forbidden. This area is entirely in state parks, military reservations, and similar areas. Virtually no forest area is noncommercial because of poor timber-growing conditions.

The oak-hickory and mixed hardwood forest types occur on approximately four-fifths of the commercial forest area of the three regions. Hardwoods predominate, although pine, cypress, and redcedar are also found in the area.

Stands in which trees of saw-timber size predominate make up nearly half of the total commercial forest area. Pole-timber stands occupy about 35 percent of the commercial forest area, and seedling and sapling stands account for nearly all of the remaining 15 percent.

The total volume of saw timber in Southern Indiana is 6.4 billion board feet. Of this total, 1.8 billion board feet are in the Lower Wabash region, 3.4 billion in the Knobs region, and 1.2 in the Upland Flats region. The oaks make up about 42 percent of the total volume. Hickory with 10 percent and yellow-poplar and beech with about 8 percent each are also important from the standpoint of volume. Nearly 90 percent of the saw-timber volume occurs in stands classified as saw timber. Most of the remaining saw-timber volume occurs in scattered larger trees in pole-timber stands. Forty percent of the saw-timber volume is found in trees 12 to 14 inches d.b.h., and 30 percent is in trees 20 inches d.b.h. and larger.

This estimate of saw-timber volume is considerably higher than previous estimates. Some of this difference is due to the inclusion by the Forest Survey of the timber volume of heavily grazed woodlands 1 acre and larger in area where the tree crowns cover at least 10 percent of the ground space. This area, totaling 206 thousand acres and supporting 509 million board feet, is so heavily grazed that, unless livestock are kept out entirely it will eventually pass from the forest classification altogether. Presumably, a considerable part of this area was classified as pasture in the earlier estimates. In this report it is included in the commercial forest area.

The proportion of the saw-timber volume in high-quality logs is low. Only 11 percent of the hardwood volume is grade 1 and 2 logs, which provide the high-quality material required by the veneer, furniture, and cooperage industries. This condition is partly due to the large proportion of small saw-timber trees in the stand. On the average, no tree less than 14 inches d.b.h. can contain grade 1 or 2 volume. Forty percent of the board-foot volume occurred in the 12- and

14-inch diameter classes, and therefore would be classified as grade 3. In time, however, much of this volume of small trees will grow into better-quality timber. The high proportion of the saw-timber volume in grade 3 logs is also partly due to the practice of cutting only the best trees in the stand and leaving the lower-quality trees.

The volume of the total forest growing stock (including the present and potentially merchantable portion of saw-timber trees and pole-timber trees) is 1.7 billion cubic feet. Of this, 1 billion cubic feet is in saw-timber trees and 0.7 billion in pole-timber trees. In addition to this growing stock, 0.9 billion cubic feet is in the limbs of saw-timber trees and in the sound portion of cull trees and trees of noncommercial species.

The average volume of saw timber per acre on all commercial forest land in Southern Indiana is 2,221 board feet. By regions these average board-foot volumes per acre vary as follows: Lower Wabash, 2,309; Knobs, 2,060; and Upland Flats, 2,671. Large saw-timber stands averaged 5,376 board feet per acre, and small saw-timber averaged 3,016 board feet per acre.

The average volume per acre of primary growing stock on commercial forest land was 582 cubic feet.

LOWER WABASH REGION

Table 1.--Forest and nonforest area by county, 1950

County	Total land area ^{1/}	Forest area		Nonforest area	
	Thousand acres	Thousand acres	Percent	Thousand acres	Percent
Clay	233	54	23	179	77
Daviess	277	41	15	236	85
Gibson	319	45	14	274	86
Greene	351	101	29	250	71
Knox	331	34	10	297	90
Martin	221	125	57	96	43
Parke	289	97	34	192	66
Pike	214	43	20	171	80
Posey	265	38	14	227	86
Putnam	314	74	24	240	76
Sullivan	293	49	17	244	83
Vanderburgh	154	19	12	135	88
Vermillion	168	31	18	137	82
Vigo	266	45	17	221	83
All Counties	3,695	796	22	2,899.	78

^{1/} Source: Area of the United States 1940, U. S. Bureau of the Census.

LOWER WABASH REGION

Table 2.--Commercial forest area by ownership class, 1950

Ownership class	Commercial forest area ^{1/}	
	<u>Thousand acres</u>	<u>Percent</u>
Federal:		
National forest	4	0.5
Other	45	5.7
Total	49	6.2
State	10	1.3
County and Municipal	(2/)	--
Private	734	92.5
All ownerships	793	100.0

^{1/} Does not include 3,000 acres of forest land in State and Federal ownerships that is reserved from commercial timber use.

^{2/} Less than 500 acres.

LOWER WABASH REGION

Table 3.--Commercial forest area by forest type and stand-size class, 1950

Forest type	Total	Large saw- timber area	Small saw- timber area	Pole- timber area	Seedling and sapling area	Non- stocked area
	Thousand acres	Per- cent	Thousand acres			
Hardwood-pine	19	2.4	--	--	--	19
Oak-hickory	252	31.8	60	46	105	40
Maple-beech	25	3.1	13	6	6	--
Mixed hardwoods	323	40.7	105	46	101	66
Pin oak flats	26	3.3	9	1	7	9
Lowland hdwds.	148	18.7	71	16	49	12
All types	793		258	115	268	146
Percent		100.0	32.5	14.5	33.8	18.4

LOWER WABASH REGION

Table 4.--Saw-timber volume on commercial forest area by species
and stand-size class, 1950

Species	Total	Large saw-timber area	Small saw-timber area	Pole-timber area	Seedling and sapling area	
	<u>Million</u> <u>bd. ft.</u>	<u>Percent</u>	- - -	<u>Million board feet</u>	- - - - -	
Softwoods ^{2/}	3	0.2	2	--	--	1
White oak	223	12.2	160	46	17	--
Post oak group	41	2.2	36	3	1	1
Black oak	115	6.3	56	41	18	--
No. red oak	124	6.8	84	31	8	1
Other red oaks	81	4.4	66	6	9	--
Hickory	181	9.9	107	54	20	--
Elm	127	6.9	91	22	14	(3/)
Soft maple	110	6.0	97	12	1	--
Sugar maple	86	4.7	59	21	6	--
Sycamore	102	5.6	80	5	16	1
Ash	111	6.0	78	29	3	1
Yellow-poplar	168	9.2	122	15	31	--
Cottonwood	62	3.4	42	13	7	--
Sweetgum	36	2.0	35	1	--	--
Blackgum	36	2.0	32	1	3	--
Beech	68	3.7	43	9	3	13
Black walnut	39	2.1	29	7	3	--
Other hardwoods	118	6.4	75	28	14	1
All species	1,831		1,294	344	174	19
Percent		100.0	70.7	18.8	9.5	1.0

- 1/ Including nonstocked areas.
2/ Consists of redcedar and baldcypress.
3/ Less than 0.5 million board feet.

LOWER WABASH REGION

Table 5. Saw-timber volume on commercial forest area by species
and tree-diameter class, 1950

Species	Total	12-14 inches ^{1/}	16-18 inches	20-22 inches	24-26 inches	28-30 inches	34 inches and larger ^{1/}
----- Million board feet -----							
Softwoods	3	1	--	2	--	--	--
White oak	223	68	71	49	24	6	5
Post oak group	41	6	8	14	6	7	--
Black oak	115	38	36	29	12	--	--
No. red oak	124	25	43	27	16	13	--
Other red oaks	81	23	32	9	8	9	--
Hickory	181	83	53	27	12	6	--
Elm	127	58	44	13	12	--	--
Soft maple	110	34	45	24	2	2	3
Sugar maple	86	37	23	14	6	6	--
Sycamore	102	27	31	22	22	--	--
Ash	111	52	34	17	3	5	--
Yellow-poplar	168	53	59	40	5	--	11
Cottonwood	62	22	15	17	8	--	--
Sweetgum	36	9	15	8	4	--	--
Blackgum	36	14	14	4	4	--	--
Beech	68	14	22	12	2	18	--
Black walnut	39	13	19	7	--	--	--
Other hardwoods	118	68	33	8	4	5	--
All species	1,831	645	597	343	150	77	19
Percent	100.0	35.2	32.6	18.7	8.2	4.2	1.1

^{1/} No 10-inch softwood trees, nor any 32-inch trees were recorded.

LOWER WABASH REGION

Table 6.--Hardwood saw-timber volume by species group and percentage distribution in log grades, 1950

Species group	Volume Million bd. ft.	Log grade		
		1	2	3
		Percent		
Oaks ^{1/}	584	1.4	6.8	91.8
Other hardwoods	1,244	5.0	9.2	85.8
All hardwoods	1,828	3.8	8.4	87.8

^{1/} Oak species combined because sampling base was too small to indicate any volume of log grade 1 in the red oak group.

LOWER WABASH REGION

Table 7.--Total cubic volume of sound wood on commercial forest area
by species and class of material, 1950

Species	Primary growing stock						
	Total	Sawlog			Pole		Cull
		Total	portion	Tops ^{1/}	trees	Limbs	trees
	Million cubic feet						
Softwoods	1.1	1.1	0.4	0.2	0.5	--	--
White oak	70.8	46.7	33.6	.9	12.2	17.6	6.5
Post oak group	15.3	9.7	6.1	.1	3.5	3.2	2.4
Black oak	37.8	24.8	17.5	.6	6.7	9.2	3.8
No. red oak	36.8	23.6	18.4	.4	4.8	9.6	3.6
Other red oaks	24.7	17.1	12.3	.4	4.4	6.4	1.2
Hickory	70.9	51.1	27.6	1.2	22.3	14.5	5.3
Elm	56.5	34.1	19.6	.7	13.8	10.2	12.2
Soft maple	52.7	28.2	17.1	.5	10.6	8.9	15.6
Sugar maple	52.8	26.8	12.9	.1	13.8	6.8	19.2
Sycamore	32.2	18.2	15.2	.7	2.3	8.0	6.0
Ash	47.0	33.8	17.5	.7	15.6	9.1	4.1
Yellow-poplar	48.2	32.3	25.1	1.2	6.0	13.1	2.8
Cottonwood	20.7	14.5	9.5	.6	4.4	4.9	1.3
Sweetgum	12.9	9.4	5.6	.3	3.5	2.9	.6
Blackgum	13.3	8.5	5.7	.1	2.7	3.0	1.8
Beech	32.9	11.7	9.8	(2/)	1.9	5.2	16.0
Black walnut	20.1	12.0	6.0	.1	5.9	3.1	5.0
Other hardwoods	69.1	45.8	18.5	.8	26.5	9.7	13.6
Noncomm. species	2.0	--	--	--	--	--	2.0
All species	717.8	449.4	278.4	9.6	161.4	145.4	123.0
Percent	100.0	62.6	--	--	--	20.3	17.1

^{1/} Includes only the portion of the upper stem capable of growing into saw-timber size and quality.

^{2/} Less than 0.05 million cubic feet.

LOWER WABASH REGION

Table 8.--Cubic volume of primary growing stock by species and stand-size class, 1950

Species	: : Total :	: Large : saw- : timber : area	: Small : saw- : timber : area	: Pole- : timber : area	: Seedling : and : sapling : area ¹
	<u>Million</u> <u>cu. ft.</u>	<u>Percent</u>	- - - -	<u>Million cubic feet</u>	- - - -
Softwoods ^{2/}	1.1	0.2	0.5	—	0.6
White oak	46.7	10.4	26.7	11.9	.1
Post oak group	9.7	2.2	5.9	2.2	.7
Black oak	24.8	5.5	9.4	8.7	.1
No. red oak	23.6	5.2	14.5	5.9	.2
Other red oaks	17.1	3.8	12.1	1.7	(3/)
Hickory	51.1	11.4	20.5	16.4	1.0
Elm	34.1	7.6	21.6	5.7	.3
Soft maple	28.2	6.3	20.6	3.8	.1
Sugar maple	26.8	6.0	14.3	8.3	—
Sycamore	18.2	4.0	13.2	1.0	.4
Ash	33.8	7.5	17.3	10.5	.2
Yellow-poplar	32.3	7.2	20.1	3.5	.3
Cottonwood	14.5	3.2	7.5	4.0	.1
Sweetgum	9.4	2.1	7.5	.3	—
Blackgum	8.5	1.9	6.2	1.0	—
Beech	11.7	2.6	7.2	2.0	1.8
Black walnut	12.0	2.7	7.3	2.3	.1
Other hardwoods	45.8	10.2	20.0	10.2	.8
All species	449.4		252.4	99.4	6.8
Percent		100.0	56.2	22.1	1.5

^{1/} Including nonstocked area.

^{2/} Includes pine, redcedar, and baldcypress in about equal proportion.

^{3/} Less than 0.05 million cubic feet.

LOWER WABASH REGION

Table 9.--Cubic volume of primary growing stock by stand-size class and tree-diameter class, 1950

Stand-size class	Total	6-8 : inches	10 : inches	12-14 : inches	16-18 : inches	20-22 : inches	24-26 : inches	28 inches and larger
	Million cubic feet							
Large saw-timber area	252.4	29.9	23.4	51.0	70.6	47.7	19.4	10.4
Small saw-timber area	99.4	23.4	18.9	41.6	13.8	1.7	--	--
Pole-timber area	90.8	39.9	22.3	18.2	6.0	.8	2.1	1.5
Seedling and sapling area ^{1/}	6.8	2.6	1.0	1.0	.2	.2	--	1.8
All classes	449.4	95.8	65.6	111.8	90.6	50.4	21.5	13.7
Percent	100.0	21.3	14.6	24.9	20.2	11.2	4.8	3.0

^{1/} Including nonstocked areas.

Table 10.--Average volume per acre by stand-size class, 1950

Stand-size class	Average volume per acre	
	Board feet	Cubic feet ^{1/}
Large saw-timber area	5016	978.3
Small saw-timber area	2991	864.3
Pole-timber area	649	338.3
Seedling and sapling area ^{2/}	125	44.7
All classes	2309	566.7

^{1/} Primary growing stock only.

^{2/} Including nonstocked areas.

KNOBS REGION

Table 1.--Forest and nonforest area by county, 1950

County	Total land area ^{1/}	Forest area		Nonforest area	
	Thousand acres	Thousand acres	Percent	Thousand acres	Percent
Brown	207	146	71	61	29
Clark	246	82	33	164	67
Crawford	200	100	50	100	50
Dubois	277	86	31	191	69
Floyd	95	36	38	59	62
Harrison	307	123	40	184	60
Jackson	333	116	35	217	65
Lawrence	294	124	42	170	58
Monroe	264	127	48	137	52
Morgan	260	84	32	176	68
Orange	259	121	47	138	53
Owen	250	116	46	134	54
Perry	246	149	61	97	39
Scott	123	43	35	80	65
Spencer	253	47	19	206	81
Warrick	250	50	20	200	80
Washington	330	118	36	212	64
All Counties	4,194	1,668	40	2,526	60

^{1/} Source: Area of the United States, 1940, U. S. Bureau of the Census.

KNOBS REGION

Table 2.--Commercial forest area by ownership class, 1950

Ownership class	Commercial forest area ^{1/}	
	<u>Thousand acres</u>	<u>Percent</u>
Federal:		
National forest	62	3.8
Other	4	.2
Total	66	4.0
State	69	4.2
County and Municipal	1	.1
Private	1,511	91.7
All ownerships	1,647	100.0

^{1/} Does not include 21,000 acres of forest land in State ownership that is reserved from commercial timber use.

KNOBS REGION

Table 3.--Commercial forest area by forest type and stand-size class, 1950

Forest type	:	:	Large	:	Small	:	Seedling	:
	:	:	saw-	:	saw-	:	and	:
	:	Total	:	timber	:	timber	:	Pole-
	:	:	:	timber	:	timber	:	sapling
	:	:	area	:	area	:	area	:
		Thousand	Per-	- - - - -	Thousand	acres	- - - - -	
		acres	cent					
Hardwood-pine	94	5.7	--	10	44	40	--	
Oak-hickory	774	47.0	118	226	302	128	--	
Maple-beech	64	3.9	30	19	15	--	--	
Mixed hardwoods	612	37.1	151	90	277	89	5	
Pin oak flats	16	1.0	7	4	5	--	--	
Lowland hdwds.	87	5.3	38	19	30	--	--	
All Types	1,647		344	368	673	257	5	
Percent		100.0	20.9	22.3	40.9	15.6	0.3	

KNOBS REGION

Table 4.--Saw-timber volume on commercial forest area by species
and stand-size class, 1950

Species	Total	Large saw- timber area	Small saw- timber area	Pole- timber area	Seedling and sapling area	
	<u>Million bd. ft.</u>	<u>Percent</u>	- - - -	<u>Million board feet</u>	- - - -	
Softwoods ^{2/}	47	1.4	3	35	7	2
White oak	519	15.3	216	225	78	--
Post oak group	60	1.8	41	15	4	--
Chestnut oak	97	2.9	28	62	7	--
Black oak	540	15.9	240	224	74	2
No. red oak	330	9.7	225	93	12	--
Other red oaks	78	2.3	47	20	11	--
Hickory	333	9.8	161	121	51	--
Elm	83	2.4	34	25	24	--
Soft maple	61	1.8	32	28	1	--
Sugar maple	213	6.3	121	69	23	--
Sycamore	85	2.5	51	17	15	2
Ash	108	3.2	59	37	12	--
Yellow-poplar	269	7.9	167	57	39	6
Sweetgum	80	2.4	62	14	4	--
Blackgum	60	1.8	48	6	6	--
Beech	253	7.5	199	37	17	--
Black walnut	46	1.3	18	9	16	3
Other hardwoods	130	3.8	73	36	21	--
All species	3,392		1,825	1,130	422	15
Percent		100.0	53.8	33.3	12.4	0.5

^{1/} Including nonstock areas.

^{2/} Consists of pine mostly but some redcedar.

KNOBBS REGION

Table 5.--Saw-timber volume on commercial forest area by species
and tree-diameter class, 1950

Species	Total	10 : inches	12-14 : inches	16-18 : inches	20-22 : inches	24-26 : inches	28-30 : inches	34 inches : and larger ^{1/}
Million board feet								
Softwoods	47	17	19	6	5	--	--	--
White oak	519	--	280	137	57	18	27	--
Post oak group	60	--	19	22	19	--	--	--
Chestnut oak	97	--	64	26	7	--	--	--
Black oak	540	--	248	160	85	31	16	--
No. red oak	330	--	113	102	59	31	25	--
Other red oaks	78	--	26	23	17	7	5	--
Hickory	333	--	193	95	38	--	7	--
Elm	83	--	53	21	9	--	--	--
Soft maple	61	--	29	19	13	--	--	--
Sugar maple	213	--	113	53	45	2	--	--
Sycamore	85	--	26	25	14	20	--	--
Ash	108	--	59	24	12	13	--	--
Yellow-poplar	259	--	97	104	54	7	7	--
Sweetgum	80	--	31	24	18	7	--	--
Blackgum	60	--	17	26	6	4	7	--
Beech	253	--	47	87	56	57	--	6
Black walnut	46	--	27	13	3	3	--	--
Other hardwoods	130	--	87	27	16	--	--	--
All species	3,392	17	1,548	994	533	200	94	6
Percent	100.0	0.5	45.6	29.3	15.7	5.9	2.8	0.2

^{1/} No. 32-inch trees were recorded.

KNOBS REGION

Table 6.--Hardwood saw-timber volume by species group and percentage distribution in log grades, 1950

Species group	Volume Million bd. ft.	Log grade	Log grade	Log grade
		1	2	3
		Percent		
White oaks ^{1/}	676	1.8	6.3	91.9
Red oaks ^{2/}	948	3.0	4.7	92.3
Other hardwoods	1,721	4.0	6.0	90.0
All hardwoods	3,345	3.3	5.7	91.0

^{1/} Includes white oak, chestnut oak, and post oak group.

^{2/} Includes black oak, northern red oak, and other red oaks.

KNOBS REGION

Table 7.--Total cubic volume of sound wood on commercial forest area
by species and class of material, 1950

Species	Total	Primary growing stock					
		Total	Sawlog	Tops ^{1/}	Pole	Limbs	Cull
- - - - - Million cubic feet - - - - -							
Softwoods	23.2	21.6	8.6	2.7	10.3	--	1.6
White oak	209.9	158.7	80.5	3.8	74.4	42.1	9.1
Post oak group	24.5	15.5	9.2	.3	6.0	4.8	4.2
Chestnut oak	41.5	30.8	15.3	.6	14.9	8.0	2.7
Black oak	193.9	137.9	83.4	2.9	51.6	43.6	12.4
No. red oak	96.8	67.4	49.7	1.3	16.4	26.0	3.4
Other red oaks	29.9	20.9	11.9	.3	8.7	6.2	2.8
Hickory	136.6	103.7	51.4	2.4	49.9	26.9	6.0
Elm	47.2	30.9	12.9	.5	17.5	6.7	9.6
Soft maple	39.2	17.5	9.7	.4	7.4	5.0	16.7
Sugar maple	113.4	75.1	32.5	.3	42.3	17.0	21.3
Sycamore	24.3	16.2	12.8	.6	2.8	6.7	1.4
Ash	49.3	36.5	16.9	.8	18.8	8.8	4.0
Yellow-poplar	84.6	59.3	40.6	2.3	16.4	21.2	4.1
Sweetgum	32.2	24.5	12.4	.8	11.3	6.5	1.2
Blackgum	22.1	14.2	9.3	.2	4.7	4.8	3.1
Beech	138.2	44.2	36.7	.1	7.4	19.2	74.8
Black walnut	23.2	14.9	7.2	.3	7.4	3.8	4.5
Other hardwoods	84.2	57.9	20.8	1.3	35.8	10.9	15.4
Noncomm. species	2.8	--	--	--	--	--	2.8
<hr/>							
All species	1,417.0	947.7	521.8	21.9	404.0	268.2	201.1
<hr/>							
Percent	100.0	66.9	--	--	--	18.9	14.2

^{1/} Includes only the portion of the upper stem capable of growing into saw-timber size and quality.

KNOBS REGION

Table 8.--Cubic volume of primary growing stock by species and stand-size class, 1950

Species	Total	Large saw- timber area	Small saw- timber area	Pole- timber area	Seedling and sapling area
	Million cu. ft.	Percent	- - - -	Million cubic feet	- - - -
Softwoods	21.6	2.3	1.5	9.9	8.9
White oak	158.7	16.7	40.3	67.4	50.9
Post oak group	15.5	1.6	7.3	4.2	4.0
Chestnut oak	30.8	3.2	5.3	17.2	8.3
Black oak	137.9	14.6	41.5	54.1	40.5
No. red oak	67.4	7.1	35.6	20.2	11.6
Other red oaks	20.9	2.2	8.9	5.1	6.9
Hickory	103.7	10.9	34.7	37.5	30.2
Elm	30.9	3.3	9.3	8.8	12.5
Soft maple	17.5	1.8	7.4	8.8	1.3
Sugar maple	75.1	7.9	29.4	26.7	19.0
Sycamore	16.2	1.7	8.0	3.7	4.1
Ash	36.5	3.9	13.4	13.0	9.8
Yellow-poplar	59.3	6.3	28.7	13.6	15.0
Sweetgum	24.5	2.6	12.8	3.8	7.9
Blackgum	14.2	1.5	8.6	2.2	3.4
Beech	44.2	4.7	31.9	8.0	4.3
Black walnut	14.9	1.6	3.6	3.1	6.6
Other hardwoods	57.9	6.1	24.2	11.7	20.8
All species	947.7		352.4	319.0	266.0
Percent		100.0	37.2	33.6	28.1

1/ Including nonstocked areas.

KNOBS REGION

Table 9.--Cubic volume of primary growing stock by stand-size class and tree-diameter class, 1950

Stand-size class	Total	6-8 inches	10 inches	12-14 inches	16-18 inches	20-22 inches	24-26 inches	28 inches and larger
	Million cubic feet							
Large saw-timber area	352.4	42.4	31.1	72.5	98.0	67.9	26.8	13.7
Small saw-timber area	319.0	68.5	63.4	143.7	34.7	7.0	1.1	.6
Pole-timber area	266.0	128.3	67.5	49.3	17.5	2.9	.5	--
Seedling and sapling area ^{1/}	10.3	6.4	1.1	2.1	.2	--	.5	--
All classes	947.7	245.6	163.1	267.6	150.4	77.8	28.9	14.3
Percent	100.0	25.9	17.2	28.2	15.9	8.2	3.1	1.5

^{1/} Including nonstocked areas.

Table 10.--Average volume per acre by stand-size class, 1950

Stand-size class	Average volume per acre	
	Board feet	Cubic feet ^{1/}
Large saw-timber area	5,305	1024.4
Small saw-timber area	3,071	866.8
Pole-timber area	627	395.2
Seedling and sapling area ^{2/}	57	39.3
All classes	2,060	575.4

^{1/} Primary growing stock only.

^{2/} Including nonstocked areas.

UPLAND FLATS REGION

UPLAND FLATS REGION

Table 1.--Forest and nonforest area by county, 1950

County	Total land area ^{1/}	Forest area		Nonforest area	
	<u>Thousand acres</u>	<u>Thousand acres</u>	<u>Percent</u>	<u>Thousand acres</u>	<u>Percent</u>
Dearborn	196	64	33	132	67
Fayette	138	19	14	119	86
Franklin	252	72	29	180	71
Jefferson	234	81	35	153	65
Jennings	241	75	31	166	69
Ohio	56	20	36	36	64
Ripley	283	66	23	217	77
Switzerland	141	45	32	96	68
Union	108	15	14	93	86
All Counties	1,649	457	28	1,192	72

^{1/} Source: Area of the United States, 1940, U. S. Bureau of the Census.

UPLAND FLATS REGION

Table 2.--Commercial forest area by ownership class, 1950

Ownership class	Commercial forest area ^{1/}	
	<u>Thousand acres</u>	<u>Percent</u>
Federal:		
National forest	0	0
Other	0	0
Total	0	0
State	(2/)	--
County and Municipal	(2/)	--
Private	434	100.0
All ownerships	434	100.0

^{1/} Does not include 19,000 acres of forest land in Federal ownership, and 4,000 acres in State ownership that is reserved from commercial timber use.

^{2/} Less than 500 acres.

UPLAND FLATS REGION

Table 3.--Commercial forest area by forest type
and stand-size class, 1950

Forest Type	:	:	Large	Small	:	Seedling
	:	:	saw	saw-	:	and
	:	Total	timber	timber	:	sapling
	:	:	area	area	:	area
	<u>Thousand</u> <u>acres</u>	<u>Per-</u> <u>cent</u>	- - - - -	<u>Thousand acres</u>	- - - - -	- - - - -
Hardwood-pine	7	1.6	--	--	7	--
Oak-hickory	137	31.6	52	30	27	28
Maple-beech	25	5.8	20	2	3	--
Mixed hardwoods	250	57.6	54	49	95	52
Pin oak flats	5	1.1	2	3	--	--
Lowland hardwoods	10	2.3	6	2	2	--
All Types	434		134	86	134	80
Percent		100.0	30.9	19.8	30.9	18.4

1/ No field plots fell in nonstocked areas.

UPLAND FLATS REGION

Table 4.--Saw-timber volume on commercial forest area by species
and stand-size class, 1950

Species	Total	Large saw- timber area	Small saw- timber area	Pole- timber area	Seedling and sapling area
	Million bd. ft.	Percent	Million board feet		
Softwoods ^{1/}	1	0.1	1		
White oak	152	13.1	123	21	8
Post oak group	34	2.9	26	2	6
Black oak	62	5.4	59	3	
No. red oak	169	14.6	116	48	5
Other red oaks	30	2.6	16	14	
Hickory	120	10.4	84	19	7
Elm	63	5.4	35	21	5
Soft maple	36	3.1	31	2	3
Sugar maple	55	4.7	45	7	
Sycamore	41	3.5	25	15	
Ash	49	4.2	24	15	10
Yellow-poplar	69	6.0	44	17	8
Sweetgum	39	3.4	27	10	2
Blackgum	22	1.9	19	3	
Beech	124	10.7	118	5	1
Black walnut	34	2.9	20	11	3
Other hardwoods	59	5.1	26	28	5
All species	1,159		838	242	63
Percent		100.0	72.3	20.9	5.4

^{1/} Consists mostly of pine; some redcedar.

^{2/} Less than 0.5 million board feet.

UPLAND FLATS REGION

Table 5.--Saw-timber volume on commercial forest area by
species and tree-diameter class, 1950

Species	Total	12-14 inches ^{1/}	16-18 inches	20-22 inches	24-26 inches	28-30 inches	32 inches and larger
Million board feet							
Softwoods	1	1	--	--	--	--	--
White oak	152	34	56	44	11	7	--
Post oak group	34	10	6	4	7	--	7
Black oak	62	7	16	29	10	--	--
No. red oak	169	54	51	30	12	12	10
Other red oaks	30	11	8	7	4	--	--
Hickory	120	43	31	16	30	--	--
Elm	63	25	21	11	2	--	4
Soft maple	36	15	10	2	2	--	7
Sugar maple	55	16	16	6	9	8	--
Sycamore	41	24	5	8	--	4	--
Ash	49	24	17	8	--	--	--
Yellow-poplar	69	26	10	12	6	--	15
Sweetgum	39	17	10	12	--	--	--
Blackgum	22	8	1	7	6	--	--
Beech	124	9	36	29	37	13	--
Black walnut	34	21	9	--	4	--	--
Other hdwds.	59	44	8	7	--	--	--
All species	1,159	389	311	232	140	44	43
Percent	100.0	33.6	26.8	20.0	12.1	3.8	3.7

^{1/} Less than 0.5 million board feet reported in 10-inch class for softwoods.

UPLAND FLATS REGION

Table 6.--Hardwood saw-timber volume by species group and percentage distribution in log grades, 1950

Species group	Volume	Log grade 1	Log grade 2	Log grade 3
	Million bd. ft.		Percent	
White oaks ^{1/}	186	4.8	5.9	89.3
Red oaks ^{2/}	261	9.2	14.6	76.2
Other hardwoods	711	3.9	9.0	87.1
All hardwoods	1,158	5.2	9.8	85.0

^{1/} Includes white oak and post oak group.

^{2/} Includes black oak, northern red oak, and other red oaks.

UPLAND FLATS REGION

Table 7.--Total cubic volume of sound material on commercial forest area by species and class of material, 1950

Species	:	Primary growing stock						:	
		Total	Sawlog			Pole	Limbs		Cull
			Total	portion	Tops ^{1/}				
- - - - - Million cubic feet - - - - -									
Softwoods	1.1	1.1	0.3	(2/)	0.8	—	—		
White oak	40.8	28.9	22.7	.4	5.8	11.9	(2/)		
Post oak group	13.9	9.3	5.2	.2	3.9	2.7	1.9		
Black oak	18.4	11.2	9.4	.1	1.7	4.9	2.3		
No. red oak	44.5	29.6	25.4	.6	3.6	13.3	1.6		
Other red oaks	10.7	7.9	4.6	.2	3.1	2.4	.4		
Hickory	42.5	31.6	18.1	.4	13.1	9.5	1.4		
Elm	28.4	18.4	9.7	.2	8.5	5.1	4.9		
Soft maple	16.7	9.0	5.5	.2	3.3	2.9	4.8		
Sugar maple	26.0	16.4	8.3	(2/)	8.1	4.4	5.2		
Sycamore	11.5	7.5	6.3	.4	.8	3.3	.7		
Ash	21.5	16.9	7.7	.3	8.9	4.0	.6		
Yellow-poplar	20.0	13.7	10.3	.4	3.0	5.4	.9		
Sweetgum	15.3	11.7	6.2	.4	5.1	3.2	.4		
Blackgum	7.3	5.2	3.4	.1	1.7	1.7	.4		
Beech	46.7	19.1	17.9	(2/)	1.2	9.4	18.2		
Black walnut	14.3	11.2	5.3	.2	5.7	2.8	.3		
Other hardwoods	36.8	27.2	9.5	.6	17.1	4.9	4.7		
Noncomm. species	.3	—	—	—	—	—	.3		
All species	416.7	275.9	175.8	4.7	95.4	91.8	49.0		
Percent	100.0	66.2	—	—	—	22.0	11.8		

^{1/} Includes only the portion of the upper stem capable of growing into saw-timber size and quality.

^{2/} Less than 0.05 million cubic feet.

UPLAND FLATS REGION

Table 8.--Cubic volume of primary growing stock by species and
stand-size class, 1950

Species	Total	Large saw- timber area	Small saw- timber area	Pole- timber area	Seedling and sapling area
	<u>Million</u> <u>cu. ft.</u>	<u>Percent</u>	- - -	<u>Million cubic feet</u>	- - -
Softwoods	1.1	0.4	0.1	0.2	0.8
White oak	28.9	10.5	19.8	6.7	1.4
Post oak group	9.3	3.4	5.3	1.5	2.3
Black oak	11.2	4.0	9.4	1.2	.6
No. red oak	29.6	10.7	18.5	10.1	1.0
Other red oaks	7.9	2.9	2.6	4.4	-.9
Hickory	31.6	11.4	16.7	8.7	4.7
Elm	18.4	6.7	8.0	8.0	1.8
Soft maple	9.0	3.3	6.4	.8	1.8
Sugar maple	16.4	5.9	11.4	3.4	.3
Sycamore	7.5	2.7	4.2	2.7	.2
Ash	16.9	6.1	6.6	5.7	4.6
Yellow-poplar	13.7	5.0	6.8	3.3	3.6
Sweetgum	11.7	4.2	6.8	2.8	2.1
Blackgum	5.2	1.9	3.6	1.6	(1/)
Beech	19.1	6.9	18.0	.9	.2
Black walnut	11.2	4.1	5.1	2.7	3.3
Other hardwoods	27.2	9.9	7.8	10.7	7.9
All species	275.9		157.1	75.4	36.6
Percent		100.0	56.9	27.3	13.3

1/ Less than 0.05 million cubic feet.

UPLAND FLATS REGION

Table 9.--Cubic volume of primary growing stock by stand-size class and tree-diameter class, 1950

Stand-size class	Total	6-8 inches	10 inches	12-14 inches	16-18 inches	20-22 inches	24-26 inches	28 inches and larger
	Million cubic feet							
Large saw-timber area	157.1	17.5	12.7	28.6	36.8	31.5	17.8	12.2
Small saw-timber area	75.4	18.3	16.5	31.5	7.0	1.5	.6	--
Pole-timber area	36.6	17.5	8.7	5.9	3.0	.9	.6	--
Seedling and sapling area	6.8	2.7	1.6	1.1	.2	--	1.2	--
All classes	275.9	56.0	39.5	67.1	47.0	33.9	20.2	12.2
Percent	100.0	20.3	14.3	24.3	17.1	12.3	7.3	4.4

Table 10.--Average volume per acre by stand-size class, 1950

Stand-size class	Average volume per acre	
	Board feet	Cubic feet ^{1/}
Large saw-timber area	6,254	1172.4
Small saw-timber area	2,814	876.7
Pole-timber area	470	273.1
Seedling and sapling area	200	85.0
All classes	2,671	635.7

^{1/} Primary growing stock only.

FOREST SURVEY PROCEDURE

The inventory of the forest resources of Southern Indiana was made during the period November 1949 to December 1950. The sampling procedure used involved an office study of aerial photographs and a field examination of randomly selected forest and nonforest plots.

The proportion of forest land in each county was obtained by placing a transparent template marked with uniformly spaced dots over aerial photographs and by counting the number of dots falling on forest and nonforest areas. The percentage of forest dots in a county, multiplied by the total area gave a preliminary estimate of the forest area. This was later adjusted after field examination indicated the number of plots that had changed from forest to nonforest since the date of aerial photography, and vice versa.

The location of a selected number of dots falling on forest land was marked on the photographs. The acre surrounding each marked dot was examined under stereoscope and was classified by stand-size class on the basis of the height, crown width, and number of trees on the plot. Plots to be examined in the field were randomly drawn from those classified under stereoscope. In making this selection the greatest weight was given to the stand-size classes containing the largest timber volume. In addition, several nonforest plots were selected for field examination to measure the movement of open land to forest since the date of photography.

The locations of the selected field plots were marked on the photographs, which were then sent to the field. Crews of two men each located these points on the ground. On forest land a 1/5-acre circular plot was established for which species, size, quality, and growth of trees were recorded.

The following tabulation gives the number of dots and plots examined for each of the three regions.

	<u>Lower Wabash Region</u>	<u>Knobs Region</u>	<u>Upland Flats Region</u>
Number of photo dots counted for forest-area determination	24,134	35,866	14,557
Number of plots stereoscopically examined on photos	1,943	3,098	890
Number of forest plots field examined	386	675	170
Number of nonforest plots field examined	65	81	21

ACCURACY OF DATA

Statistical analysis of forest-area and timber-volume data shows the following sampling errors^{1/} for each of the three regions.

<u>Region</u>	<u>Forest area</u>		<u>Saw-timber volume</u>	
	(M acres)	(Percent)	(Million cu. ft.)	(Percent)
Lower Wabash	793	3.2	449.4	3.9
Knobs	1,647	1.6	947.7	2.7
Upland Flats	434	4.0	275.9	5.6

These estimates of sampling error do not include errors resulting from the development and application of volume tables and cull factors, or from mistakes in measurement or judgment. All phases of field and office work were closely supervised to keep these errors to a minimum. Since the percentage error increases with each subdivision of the total, small acreages or volumes may have large errors and may therefore indicate only relative magnitudes.

^{1/} At one standard deviation; i.e., the chances are two out of three that, if the survey were repeated, the total forest area or volume figures would not differ more than the errors shown in this table.

EXPLANATION OF TERMS USED

Forest land.--Includes (a) lands which are at least 10 percent stocked by trees of any size and capable of producing timber or other wood products, or of exerting an influence on the climate or on the water regime; (b) land from which the trees described in (a) have been removed to less than 10 percent stocking and which have not been developed for other use; (c) afforested areas; and (d) chaparral areas.

The minimum area that will qualify as forest land is 1 acre. Strips of timber must be at least 120 feet wide before the area will qualify as forest land. Conversely, clearings, streams, and unimproved treeless strips less than 1 acre in area or less than 120 feet in width within forest areas will be classified as forest land. Improved rights-of-way such as graded roads, railroads, or transmission lines will be classified as nonforest regardless of width.

Commercial forest land.--Forest land which is (a) producing, or physically capable of producing, usable crops of wood (usually saw timber), (b) economically available now or prospectively, and (c) not withdrawn from timber utilization.

Reserved forest land.--Forest land that has been withdrawn from timber utilization through statute, ordinance, or administrative order.

Noncommercial forest land.--Forest land incapable of yielding usable wood products (usually saw timber) because of adverse site conditions, or so physically inaccessible as to be permanently unavailable economically, and not withdrawn for specified purposes.

Forest types

Hardwood-pine.--Forests of pines, oak, and other hardwoods in which pines comprise 25-50 percent of the dominant and codominant trees.

Oak-hickory.--Forests of hardwoods in which oaks and hickories comprise at least 50 percent of the dominant and codominant trees, except where pines comprise 25 percent or more, in which case the stand would be classified as hardwood-pine.

Maple-beech.--Forests in which at least 50 percent of the dominant and codominant trees are sugar maple or beech, singly or in combination.

Mixed hardwoods.--Forests in which 50 percent or more of the stand is upland ash, elm, basswood, walnut, soft maples, or associated species, singly or in combination, except where pines comprise 25 percent or more of the stand, in which case the stand would be classed as hardwood-pine.

Pin oak flats.--Forests on poorly drained flats in which 25 percent of the dominant and codominant trees are pin oaks.

Lowland hardwoods.--Forests on characteristically moist to wet sites where 50 percent or more of the stand is composed of sycamore, hackberry, honey locust, blackgum, sweetgum, southern cypress, ash, elm, willow, cottonwood, and red and silver maple, singly or in combination.

Tree classes

Saw-timber tree.--A live softwood (coniferous) tree at least 9.0 inches d.b.h. or live hardwood trees of commercial species at least 11.0 inches d.b.h., with a sound butt log at least 8 feet long, or with at least half of the gross volume of the tree in sound material.

Pole-timber tree.--A live, sound tree at least 5.0 inches d.b.h. but less than saw-timber size that gives promise of becoming a saw-timber tree.

Cull tree.--A live tree at least 5.0 inches d.b.h. that does not qualify as a saw-timber or pole-timber tree because of species, poor form, limbiness, rot, or other defect.

Volume estimates

Board-foot volume includes the volume of that portion of live saw-timber trees merchantable for sawlogs, but not less than 8 inches in diameter (see specification for grade 3 hardwood logs, page 38). Volume deductions have been made for rot, crook, and other defects. Board-foot volumes are shown in the International 1/4-inch log rule, which approximates green lumber tally.

Cubic-foot volume

Total volume includes the sound wood inside bark in both sound and cull living trees 5.0 inches d.b.h. and larger, from the stump to a minimum top diameter of 4.0 inches inside bark. It includes the upper stems of softwood trees and the upper stems and limbs of hardwoods.

Growing stock includes the volume of sound wood inside bark in (1) the sawlog portion of saw-timber trees, (2) the upper stem of softwood saw-timber trees to a minimum top diameter of 4.0 inches inside bark, (3) the upper stem of hardwood saw-timber trees to the limit of potential merchantability for saw timber, but never less than 4 inches inside bark, and (4) pole-timber trees to a minimum top diameter of 4.0 inches inside bark.

Stand-size class

Large saw timber.--Stands having a minimum net volume of 1500 board feet per acre in saw-timber trees, and having more than half of this volume in trees 15.0 inches d.b.h. and larger.

Small saw timber.--Stands having a net volume of 1500 board feet per acre in saw-timber trees, and having at least half of this volume in trees smaller than 15.0 inches d.b.h.

Pole timber.--Stands failing to meet the saw-timber stand specifications, but at least 10 percent stocked with pole-timber and larger trees and with at least half the minimum stocking in pole-timber trees.

Seedlings and Saplings.--Stands not qualifying as either saw-timber or pole-timber stands but having at least 150 seedlings and saplings of commercial species per acre.

Nonstocked.--Commercial forest land not qualifying for any other class.

Hardwood log grades

Grade 1.--Butt logs at least 14.0 inches (uppers at least 16 inches) in diameter inside bark with five-sixths of the surface on the three best faces clear of defect in not more than two cuttings, (minimum length of cutting variable, 3-7 feet, depending upon log diameter and position in tree). Lumber from such logs will normally grade at least 60 percent No. 1 common and better.

Grade 2.--Logs at least 12 inches in diameter inside bark with two-thirds of the surface on the three best faces clear of defect in not more than three cuttings, (minimum length of cutting, 3 feet). Lumber from such logs will normally grade at least 35 percent No. 1 common and better.

Grade 3.--Merchantable logs at least 8.0 inches in diameter inside bark which do not meet the requirements of higher grades. Such logs will normally produce less than 35 percent No. 1 common and better lumber or will be suitable for ties or timbers.

Species listed

Softwoods

Virginia pine	- <u>Pinus virginiana</u>
Shortleaf pine	- <u>Pinus echinata</u>
Pitch pine	- <u>Pinus rigida</u>
White pine	- <u>Pinus strobus</u>
Baldcypress	- <u>Taxodium distichum</u>
Redcedar	- <u>Juniperus virginiana</u>
Hemlock	- <u>Tsuga canadensis</u>

Hardwoods

White oak	- <u>Quercus alba</u>
Post oak group includes:	
Post oak	- <u>Quercus stellata</u>
Swamp white oak	- <u>Quercus bicolor</u>
Swamp chestnut oak	- <u>Quercus prinus</u>
Overcup oak	- <u>Quercus lyrata</u>
Bur oak	- <u>Quercus macrocarpa</u>
Chinquapin oak	- <u>Quercus muehlenbergii</u>
Chestnut oak	- <u>Quercus montana</u>
Black oak includes:	
Black oak	- <u>Quercus velutina</u>
Scarlet oak	- <u>Quercus coccinea</u>
Northern red oak includes:	
Northern red oak	- <u>Quercus borealis</u>
Swamp red oak	- <u>Quercus falcata var. pagodaefolia</u>
Cherrybark oak	- <u>Quercus falcata var. leucophylla</u>
Other red oaks include:	
Southern red oak	- <u>Quercus falcata</u>
Pin oak	- <u>Quercus palustris</u>
Willow oak	- <u>Quercus phellos</u>
Water oak	- <u>Quercus nigra</u>
Shingle oak	- <u>Quercus imbricaria</u>
Hickory	- <u>Carya species</u>
Elm	- <u>Ulmus species</u>
Soft maple includes:	
Red maple	- <u>Acer rubrum</u>
Silver maple	- <u>Acer saccharinum</u>
Boxelder	- <u>Acer negundo</u>
Sugar maple	- <u>Acer saccharum</u>
Sycamore (American)	- <u>Platanus occidentalis</u>
Ash	- <u>Fraxinus species</u>
Yellow-poplar	- <u>Liriodendron tulipifera</u>

Cottonwood (Eastern)	- <u>Populus deltoides</u>
Cottonwood (Swamp)	- <u>Populus heterophylla</u>
Sweetgum	- <u>Liquidambar styraciflua</u>
Blackgum	- <u>Nyssa sylvatica</u>
Blackgum (Swamp)	- <u>Nyssa aquatica</u>
Beech	- <u>Fagus grandifolia</u>
Black walnut	- <u>Juglans nigra</u>
Other hardwoods - include all other commercial hardwood species.	

Noncommercial species - include species that do not normally have commercial value such as hawthorn, redbud, hornbeam, hophornbeam, alder, and serviceberry.

TERRITORY SERVED BY THE
CENTRAL STATES FOREST EXPERIMENT STATION
FOREST SERVICE
U. S. DEPARTMENT OF AGRICULTURE

